EGU22-11331
https://doi.org/10.5194/egusphere-egu22-11331
EGU General Assembly 2022

High resolution luminescence dating of the Süttő loess-paleosol sequence (MIS 6-2) to create an age depth model and calculate mass accumulation rates - as input data for paleoclimate models

Novothny Ágnes, Sipos György, Filyó Dávid, Surányi Gergely, Végh Tamás, Csonka Diána, Bartyik Tamás, Magyar Gergő, Újvári Gábor, and Horváth Erzsébet
Eötvös Loránd University, Institute of Geography and Geology, Department of Physical Geography; Pázmány Péter sétány 1/C, 1117 Budapest, Hungary

Loess-paleosol sequences are among the most important and detailed terrestrial records of local climate and environmental changes during the Pleistocene. The Carpathian Basin can offer a unique opportunity to investigate temporal and spatial variations in dust accumulation, since 20-25% of its area is covered by loess and the thickness of these material is considerable (80-90 m at max).

High-resolution data are available for some loess sections (Jingbian, Sanbahuo, Toshan, Dunaszekcső) making it possible to develop reliable age-depth models and to calculate more precise mass accumulation rates (MARs), being among the most important input data of paleoclimate models. However, these measurements are mostly limited at around 50 k age, because they are based on radiocarbon or quartz luminescence ages. In our project, the 20 m thick loess-paleosol profile at Süttő, in the northern part of the Carpathian Basin, was investigated first. More than 130 luminescence and some radiocarbon samples were collected during the sampling campaign during the winter of 2020-21. A systematic sampling for porosity/density measurement was also carried out parallel to luminescence sampling.

This profile was previously dated by Novothny et al. using multiple aliquot additive dose Infrared Stimulated Luminescence (IRSL), single aliquot regeneration IRSL with fading correction, and it resulted in the deposition period of the dust during MIS 6 - MIS 2. The luminescence ages in this study are calculated based on the Optically Stimulated Luminescence signal of quartz for the younger part of the sequence and using the post-Infrared IRSL signal of polymineral fine-grains for the older than ~50 ka part of the sequence. The samples were collected from every 20 cm, and every 10^{th} samples are considered as primary or benchmark samples and therefore complete luminescence tests, residual dose, a-value, and fading measurements are carried out on them. The secondary samples are only measured by shortened measurement routine to optimize the measurement strategy and save measurement time.

Age-depth modelling will be carried out using an R-package specially developed for the Bayesian and inverse modelling of luminescence ages. Based on the constructed age-depth models and the

already available datasets MARs will be calculated for each MI stages.

Luminescence properties and variation of dose rate may also have a paleo-environmental relevance, e.g. the luminescence sensitivity of the quartz fraction can refer to the provenance of the dust. Dose rate measurements will be performed by two Canberra type gamma spectrometers equipped with a GX2018 extended range Ge detector and a MiDose alpha/beta counter, which also enables microdosimetric analyses and comparison between the different kinds of detectors.

The research was supported by the NKFIH project K 135509.